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TITLE: Pet food composition for controlling postprandial glycemic responseAbstract Text (1):

A composition and process of using it are provided to improve glucose and insulin metabolism in companion animals by controlling the postprandial glycemic and/or insulin response in those animals. The composition includes a source of protein, a source of fat, and a source of carbohydrates from a multiple grain source containing a blend of sorghum and barley; a blend of corn and barley; or a blend of corn, sorghum and barley.

Brief Summary Text (3):

Several different conditions are associated with impaired glucose metabolism in companion animals such as the dog and cat. These include diabetes (both insulin dependent type and non-insulin dependent maturity onset type), obesity, geriatrics, and gestation (pregnancy). It is estimated that one out of every 100 dogs seen by a practicing veterinarian is diabetic. Obesity is estimated to occur in approximately 40% of the dog population. Of course, older companion animals (approximately 10% of the U.S. dog and cat populations are believed to be 11 years of age or older) and pregnant animals are common. Accordingly, there is a substantial percentage of the dog and cat population which are in categories associated with risk of having or developing problems with glucose metabolism.

Brief Summary Text (6):

Another associated metabolic disorder with obesity and diabetes is hyperinsulinemia. Hyperinsulinemia is the presence of insulin at abnormally high levels in the blood. Counteracting the effects of hyperinsulinemia by lowering insulin levels in the blood can help lessen the progression of obesity and diabetes.

Brief Summary Text (7):

There have been attempts made in the past to control diabetics not only with drug therapy, but also with diet. Dietary fiber has been found to have an effect on controlling diabetes under certain circumstances. The addition of certain soluble fibers such as guar and pectin have been found to yield a reduced postprandial rise in blood glucose levels. However, not all soluble fibers provide benefits, and some result in undesirable side effects for the animal including diarrhea, flatulence, and abdominal cramping.

Brief Summary Text (10):

The present invention meets these needs by providing a composition and process of using it to improve glucose and/or insulin metabolism in companion animals by controlling the postprandial glycemic and insulin responses in those animals. In accordance with one aspect of the present invention, a pet food composition is provided and includes a source of protein, a source of fat, and a source of carbohydrates from a multiple grain source comprising a blend of sorghum and barley; a blend of corn and barley; a blend of corn and sorghum; or a blend of corn, sorghum, and barley. Preferably, the weight ratio of grain sources in the preferred blends is from about 1:5 to about 5:1, and more preferably the weight ratio of the preferred blends contains approximately equal amounts of each grain (i.e., a 1:1 ratio). Where a combination of three grain sources is used, the weight ratios of the lowest to highest amount of grain source will vary between from about 1:1 to about 5:1.

Brief Summary Text (11):

Preferably, the composition comprises from about 20 to about 40% crude protein, from about 4 to about 30% fat, from about 4 to about 20% total dietary fiber, and a source of starch which includes a blend of grain sources as previously described, although no specific ratios or percentages of these nutrients are required.

Brief Summary Text (12):

The pet food composition may optionally include chromium tripicolinate and a water soluble, cellulose ether. Additionally, the pet food composition may further include from about 1 to about 11 weight percent of supplemental total dietary fiber of fermentable fibers which have an organic matter disappearance of 15 to 60 weight percent when fermented by fecal bacteria for a 24 hour period.

Brief Summary Text (13):

The invention also includes a process for controlling postprandial glycemic response in a companion animal comprising the step of feeding the companion animal a pet food composition consisting essentially of a source of protein, a source of fat, and a source of carbohydrates from a multiple grain source comprising a blend of sorghum and barley; a blend of corn and barley; a blend of corn and sorghum; or a blend of corn, sorghum, and barley. The invention also includes a process for controlling hyperinsulinemia in a companion animal comprising the step of feeding the companion animal a pet food composition consisting essentially of a source of protein, a source of fat, and a source of carbohydrates from a multiple grain source comprising a blend of sorghum and barley; a blend of corn and barley; a blend of corn and sorghum; or a blend of corn, sorghum, and barley.

Detailed Description Text (2):

The present invention utilizes a pet food composition which contains a multiple grain source which includes a blend of sorghum and barley; a blend of corn and sorghum; a blend of corn and barley; or a blend of corn, sorghum, and barley as starch sources to control the postprandial rise of both glucose and insulin levels in a companion animal. The use of additional grain sources in the present invention is optional. As used herein, "multiple grain source" means at least two different grain sources. Through the use of a multiple grain source, the diet of the animal aids in regulating the animal's glucose metabolism and insulin response after meals in an effective manner. Both healthy animals, as well as animals suffering from diabetes, obesity, hyperinsulinemia, geriatric animals, and pregnant animals will benefit from being fed the composition of the present invention.

Detailed Description Text (3):

The composition also optionally contains other ingredients which also have the effect of minimizing the postprandial glycemic and/or insulin response in an animal. The composition may include chromium tripicolinate in an amount of from between about 10 to about 500 micrograms of chromium per day. Chromium tripicolinate occurs in brewer's yeast, and the yeast may be added to the pet food composition. Alternatively, the chromium tripicolinate may be added to the composition in a substantially pure form.

Detailed Description Text (5):

The pet food composition of the present invention may also optionally contain a source of fermentable fibers which display certain organic matter disappearance percentages. The fermentable fibers which may be used have an organic matter disappearance (OMD) of from about 15 to 60 percent when fermented by fecal bacteria in vitro for a 24 hour period. That is, from about 15 to 60 percent of the total organic matter originally present is fermented and converted by the fecal bacteria. The organic matter disappearance of the fibers is preferably 20 to 50 percent, and most preferably is 30 to 40 percent.

Detailed Description Text (8):

The pet food composition can be any suitable pet food formula which also provides adequate nutrition for the animal. For example, a typical canine or feline diet for use in the present invention may contain from about 20 to about 40% crude protein (and preferably about 25 to about 35%), from about 4 to about 30% fat (and preferably about 8 to about 12%), and from about 4 to about 20% total dietary fiber, along with the multiple starch source, all percentages by weight. However, no specific ratios or percentages of these nutrients are required.

Detailed Description Text (9):

The fermentable fibers may be any fiber source which intestinal bacteria present in the animal can ferment to produce significant quantities of SCFAs. "Significant quantities" of SCFAs, for purposes of this invention, are amounts over 0.5 mmol of total SCFAs/gram of substrate in a 24 hour period. Preferred fibers include beet pulp, gum arabic (including gum talha), psyllium, rice bran, carob bean gum, citrus pulp, pectin, fructooligosaccharides and inulin, mannanoligosaccharides and mixtures of these fibers.

Detailed Description Text (10):

The fermentable fibers are used in the pet food composition in amounts from 1 to 11 weight percent of supplemental total dietary fiber, preferably from 2 to 9 weight percent, more preferably from 3 to 7 weight percent, and most preferably from 4 to 7 weight percent.

Detailed Description Text (11):

A definition of "supplemental total dietary fiber" first requires an explanation of "total dietary fiber". "Total dietary fiber" is defined as the residue of plant food which is resistant to hydrolysis by animal digestive enzymes. The main components of total dietary fiber are cellulose, hemicellulose, pectin, lignin and gums (as opposed to "crude fiber", which only contains some forms of cellulose and lignin). "Supplemental total dietary fiber" is that dietary fiber which is added to a food product above and beyond any dietary fiber naturally present in other components of the food product. Also, a "fiber source" is considered such when it consists predominantly of fiber.

Detailed Description Text (21):

During the study period, five experimental diets were evaluated. All the diets were formulated to contain equal starch content (approximately 30%) from different cereal sources as listed above (corn, wheat, barley, rice, and sorghum). To achieve this, protein levels were allowed to vary. The experimental diets were processed similarly with each starch source consisting of whole grain without the hull. Individual daily feed allowances were based on the stabilization period intake.

Detailed Description Text (22):

The nutrients in the diets were analyzed by AOCS-AOAC methods (Association of Official Analytical Chemists--Official Methods of Analysis, Arlington, Va., 1994.). Protein was determined by Leco combustion analyzer (AOAC 990.03), fat was determined by acid hydrolysis (AOAC 920.39), crude fiber was determined by Fibertec (AOAC 973.18), moisture was determined by drying sample at 135.degree. C. for 2 hours (AOAC 30.15), and total ash was determined by incinerating the sample at 600.degree. C. for 4 hours (AOAC 920.39). Nitrogen-free-extract (NFE) was computed as the difference between 100% and the sum of protein, fat, fiber, ash and water content. Calcium and phosphorus contents of the diets were determined by atomic absorption spectrophotometer (AOAC 968.08) and Vanado-Molybdate method (AOAC 965.15) respectively. Starch was assayed quantitatively (Bondar, R. J. L., and D. C. Mead, "Evaluation of glucose-6-phosphate dehydrogenase from Leuconostoc mesenteroides in the hexokinase method for determining glucose in starch," Clin. Chem. 20:586 (1974); MacRae, J. C., and D. G. Armstrong, J. Sci. Food Agric. 19:578 (1968)), .beta.-glucan fractions were enzymatically quantitated (AOAC 995.16), and total dietary fiber was assayed by the standard enzymatic/gravimetric procedure (AOAC 991.43).

Detailed Description Text (26):

The dry matter and starch contents were similar in all diets (91.7 to 93.6 wt % and 32.3 to 34.6 wt %, respectively). The fat content varied from 11.4 (rice) to 12.2 wt % (barley) and protein from 30.9 (barley) to 41.5 wt % (rice). The NFE content was highest for sorghum (35.7 wt %) and lowest for rice (32.2 wt %). Total dietary fiber was highest (17.0 wt %) for barley and lowest for sorghum (6.5 wt %).

Detailed Description Paragraph Table (1):

TABLE 1 Ingredient composition of starch diets

Ingredient	Corn	Wheat	Barley	Rice
Sorghum Starch source*	45.4	48.0	56.1	38.1
Poultry by-product meal	39.5	35.5	25.6	46.6
Beet pulp	5.0	5.0	5.0	5.0
Poultry <u>fat</u>	1.6	3.0	4.0	2.0
Dried egg product	2.0	2.0	2.0	2.0
Chicken digest	2.0	2.0	2.0	2.0
Brewer's yeast	1.0	1.0		

1.0 1.0 1.0 Fish meal 1.0 1.0 1.0 1.0 1.0 Minerals 1.5 1.5 2.2 1.5 1.4 Vitamins 0.6
0.6 0.6 0.5 0.6 DL-Methionine 0.4 0.4 0.5 0.3 0.3 *Respective cereal flours for each
diet.

Detailed Description Paragraph Table (2):

TABLE 2 Diet Composition Nutrients Wheat Barley Rice Corn Sorghum Protein* 36.1 30.9
41.5 37.6 38.5 Ash 7.3 7.5 8.1 7.5 7.8 Fat 12.2 12.2 11.4 11.4 11.6 TDF 11.8 17.0 6.9
9.9 6.5 NFE 32.4 32.4 32.2 33.5 35.7 Calcium 1.3 1.2 1.6 1.3 1.4 Phosphorus 1.1 1.0
1.2 1.2 1.2 Beta Glucans ND** 0.02 ND ND ND Starch 33.2 32.3 34.0 34.6 34.6 *All
values expressed on a percent dry matter basis. **Not detectable.

CLAIMS:

1. A pet food composition for controlling postprandial glycemic response in a companion animal comprising a source of protein, a source of fat, and a source of carbohydrates from a multiple grain source comprising a blend of sorghum and barley; a blend of corn and barley; or a blend of corn, sorghum, and barley.
2. A pet food composition as claimed in claim 1 in which the weight ratio of grain sources is from about 1:5 to about 5:1.
3. A pet food composition as claimed in claim 1 in which the ratio of grain sources is about 1:1.
4. A pet food composition as claimed in claim 1 further including chromium tripicolinate.
5. A pet food composition as claimed in claim 1 further including a water-soluble cellulose ether.
6. A pet food composition as claimed in claim 1 further including from about 1 to about 11 weight percent of supplemental total dietary fiber of fermentable fibers which have an organic matter disappearance of 15 to 60 weight percent when fermented by fecal bacteria for a 24 hour period.
7. A pet food composition for controlling postprandial glycemic response in a companion animal comprising from about 20 to about 40% crude protein, from about 4 to about 30% fat, from about 4 to about 20% total dietary fiber, and a source of carbohydrates from a multiple grain source comprising a blend of sorghum and barley; a blend of corn and barley; or a blend of corn, sorghum, and barley.
8. A pet food composition as claimed in claim 7 in which the weight ratio of grain sources is from about 1:5 to about 5:1.
9. A pet food composition as claimed in claim 7 in which the weight ratio of grain sources is about 1:1.
10. A pet food composition as claimed in claim 7 further including chromium tripicolinate.
11. A pet food composition as claimed in claim 7 further including a water-soluble cellulose ether.
12. A pet food composition as claimed in claim 7 further including from about 1 to about 11 weight percent of supplemental total dietary fiber of fermentable fibers which have an organic matter disappearance of 15 to 60 weight percent when fermented by fecal bacteria for a 24 hour period.